

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1     1. A voltage regulator for an electrical device  
2     having a plurality of operating modes having  
3     differing current consumption, said voltage  
4     regulator comprising  
5         a regulator stage having an input for receiving  
6     an input voltage, and  
7         a  $V_{bus}$  supply regulator stage having an input  
8     for receiving information corresponding to an  
9     operational mode of said electrical device and  
10    supplying a voltage corresponding to said  
11    operational mode or said current consumption as said  
12    input voltage to said regulator stage.
- 1     2. A voltage regulator as recited in claim 1,  
2     wherein said electrical device exhibits a working  
3     mode and a sleep mode.
- 1     3. A voltage regulator as recited in claim 2,  
2     wherein said electrical device is a CPU.
- 1     4. A voltage regulator as recited in claim 1,  
2     wherein said  $V_{bus}$  supply regulator stage provides one  
3     of two discrete voltages.

1     5. A voltage regulator as recited in claim 1,  
2     further comprising  
3         a ramp generator for generating a ramp waveform  
4     having an amplitude corresponding to said selected  
5     voltage for control of said regulator stage.

1     6. A voltage regulator as recited in claim 1,  
2     further including  
3         a feedback loop in said  $V_{bus}$  supply regulator  
4     stage.

1     7. A voltage regulator as recited in claim 6,  
2     wherein said feedback loop includes an  $R_{tilt}$  resistor.

1     8. A voltage regulator as recited in claim 6,  
2     further including  
3         a feedback loop in said regulator stage  
4     including signal paths for signals corresponding to  
5     output voltage and output current of said voltage  
6     regulator, respectively.

1     9. A voltage regulator as recited in claim 8,  
2     wherein said signal path for said signal  
3     corresponding to output voltage includes an  $R_{droop}$   
4     resistor.

1     10. A voltage regulator as recited in claim 8,  
2     further including  
3         a connection for supplying said signal  
4     corresponding to said output current to said  
5     feedback loop of said  $V_{bus}$  supply regulator stage for  
6     making an adjustment to a said voltage.

1 11. A voltage regulator as recited in claim 10,  
2 wherein said adjustment to said voltage provides a  
3 continuous range of voltages.

1 12. A voltage regulator as recited in claim 11,  
2 wherein said regulator stage comprises a plurality  
3 of parallel voltage regulator circuits

1 13. A voltage regulator as recited in claim 12  
2 wherein operation of selected ones of said parallel  
3 voltage regulator circuits may be discontinued in  
4 response to current load requirements.

1 14. An electrical device comprising  
2 a load having a plurality of operating modes  
3 having differing current consumption, and  
4 a voltage regulator, said voltage regulator  
5 including  
6 a regulator stage having an input for  
7 receiving an input voltage, and  
8 a  $V_{bus}$  supply regulator stage having  
9 an input for receiving information  
10 corresponding to an operational mode or  
11 current consumption of said electrical  
12 device and supplying a voltage  
13 corresponding to said operational mode or  
14 current consumption as said input voltage  
15 to said voltage regulator stage.

1 15. An electrical device as recited in claim 14,  
2 further including  
3 a feedback loop in said  $V_{bus}$  supply regulator  
4 stage.

1     16. An electrical device as recited in claim 15,  
2     wherein said feedback loop includes an  $R_{\text{tilt}}$  resistor.

1     17. An electrical device as recited in claim 15,  
2     further including  
3         a feedback loop in said regulator stage  
4     including signal paths for signals corresponding to  
5     output voltage and output current of said voltage  
6     regulator, respectively.

1     18. An electrical device as recited in claim 17,  
2     wherein said signal path for said signal  
3     corresponding to output voltage includes an  $R_{\text{droop}}$   
4     resistor.

1     19. An electrical device as recited in claim 17,  
2     further including  
3         a connection for supplying said signal  
4     corresponding to said output current to said  
5     feedback loop of said  $V_{\text{bus}}$  supply regulator stage for  
6     making an adjustment to a said voltage.

1     20. An electrical device as recited in claim 19,  
2     wherein said adjustment to said voltage provides a  
3     continuous range of voltages.